



SAM21 Shelf Controller Basics

What's new for SN08

The following changes were made in this release:

- A description is added for Feature A00008431, System Mastership Support for CS2000 - Compact Geographic Survivability Configuration. For more information about Geographic Survivability, refer to CS 2000 - Compact overview in *Call Agent Basics*, NN10023-111.
- The following hardware changes were made in this release:
 - The NTRX51KE OAME frame can be converted to an NTRX51LA COAM frame. The conversion takes place at installation. For details, refer to the procedure *NTRX51KE OAME to NTRX51LA COAM Conversion* in Installation Manual 0000007-74-0135.
 - Call Control Frame NTRX51TA is modified to support Session Server for configurations with less optional equipment and therefore extra space in the frame. A new breaker interface at the top of each frame provides power distribution to support the Session Server.
 - New Gateway Controller (GWC) card MCG MCPN905-240 replaces MCPN750 (still supported).
 - The Compact Universal Signaling Point (USPc) uses new card MCPN905-220 (feature A00007355).
 - The Core and Billing Manager (CBM) becomes a high availability configuration using two Sun Netra 240 servers in the COAM frame. (*CBM is not supported on the Sun Netra T1400 hardware.*)

What's new for SN07

Centrex IP Client Manager (CICM) and CICM Manager are supported application types in a SAM21 shelf.

The software for the SAM21 Shelf Controller is enhanced to reduce memory consumption. Robustness is improved by having each SAM21 Shelf Controller report status to the other unit. In the event that the active unit encounters an error, activity switches to the inactive SAM21 Shelf Controller. If the inactive SAM21 Shelf Controller is degraded, or both units are equally degraded, the active SAM21 Shelf Controller locks and unlocks the inactive SAM21 Shelf Controller. After the unlock, status is reevaluated, and a switch of activity may occur.

If the SAM21 Shelf Controller is configured with an ATM interface, and the office uses Integrated Element Manager System (IEMS), then performance statistics for the ATM interface are available at the IEMS. This requires provisioning the IP address of the server that runs the IEMS application at the CS 2000 SAM21 Manager.

In some cable access markets, the SAM21 shelf offered in an alternating current (AC) configuration to be installed in a customer supplied frame. AC power does not affect the function of the SAM21 Shelf Controllers, Gateway Controllers (GWC), or any other cards in the SAM21 shelf. When deployed in an AC configuration, Nortel recommends using separate circuits to power each shelf input. The PEC code for the AC powered SAM21 shelf is NTRX51NA. The -48 V DC powered shelf has an NTRX51FX PEC.

Information about Cabinetized SAM (CSAM) and C28B cabinets was removed from this document. Since the SN05 release, all SAM21 shelves are housed in PTE2000 frames.

Software on the SAM21 Shelf Controller synchronizes to the primary Network Time Protocol (NTP) server provisioned at the CS 2000 SAM21 Manager client. If the NTP server is on line and available, log reports and alarms are synchronized with the time at the NTP server. The secondary NTP server is not used by the SAM21 Shelf Controllers.

What's new for SN06

After the CS 2000 SAM21 Manager server application is upgraded and migrated to the server that hosts the CS 2000 Management Tools, the CS 2000 SAM21 Manager client application is started from a web browser rather than a console.

Enhancements to fault management have been made in this release. The SAM21 Shelf Controllers now store a copy of many of the bootloads for the cards in the shelf and can bootload those cards over the backplane to reduce dead shelf recovery (DSR) time.

Operational measurements (OM) are available from SAM21 Shelf Controllers with ATM interfaces. The statistics are gathered by the SNMP Poller on the host that provides the CS 2000 Management Tools and interpretation of that data is completed by an OSS tool.

Functional description

Services Application Module 21 (SAM21) shelves are mounted in a Nortel PTE2000 frame. PTE2000 frames have two configurations, the Call Control Frame (CCF), and the SAMF frame. The SAMF frame is deployed with CS 2000 XA-Core switches and can also be deployed with CS 2000 - Compact switches when additional Gateway Controllers (GWC) are needed. CS 2000 - Compact configurations require the CCF.

The SAM21 shelf has 21 chassis slots. The hardware platform for the SAM21 shelf is the Motorola CPX8221 cPCI chassis. Two slots are dedicated for MCP750HA PowerPC (PPC) SAM21 Shelf Controller cards and two for hot swap controllers (HSC).

Two SAM21 Shelf Controllers are required for each shelf. These cards reside in slots 7 and 9 of the SAM21 shelf. The SAM21 Shelf Controllers:

- manage the hardware states of the other cards in the SAM21 shelf
- communicate with the CS 2000 SAM21 Manager to enable administration of cards in the shelf
- forward alarms to the CS 2000 SAM21 Manager related to environmental alarms
- forward alarms to the CS 2000 SAM21 Manager related to the hardware states of the cards in the shelf

- in some Asynchronous Transfer Mode (ATM) networks the SAM21 Shelf Controllers are equipped with an ATM interface to enable Classical IP over ATM (CIPOA) communication between the Gateway Controllers in the SAM21 shelf and media gateways on the ATM network

The active SAM21 Shelf Controller automatically recovers cards in the shelf that experience a software error. The SAM21 Shelf Controller polls the cards in the shelf with a boot audit process to determine if the cards are in-service. If a card is not in-service, firmware on the card attempts a Network Autoboot to restore service. If the Network Autoboot fails, the active SAM21 Shelf Controller initiates an autoboot of the card to restore service. Refer to the *SAM21 Shelf Controller Fault Management*, NN10089-911 for more information.

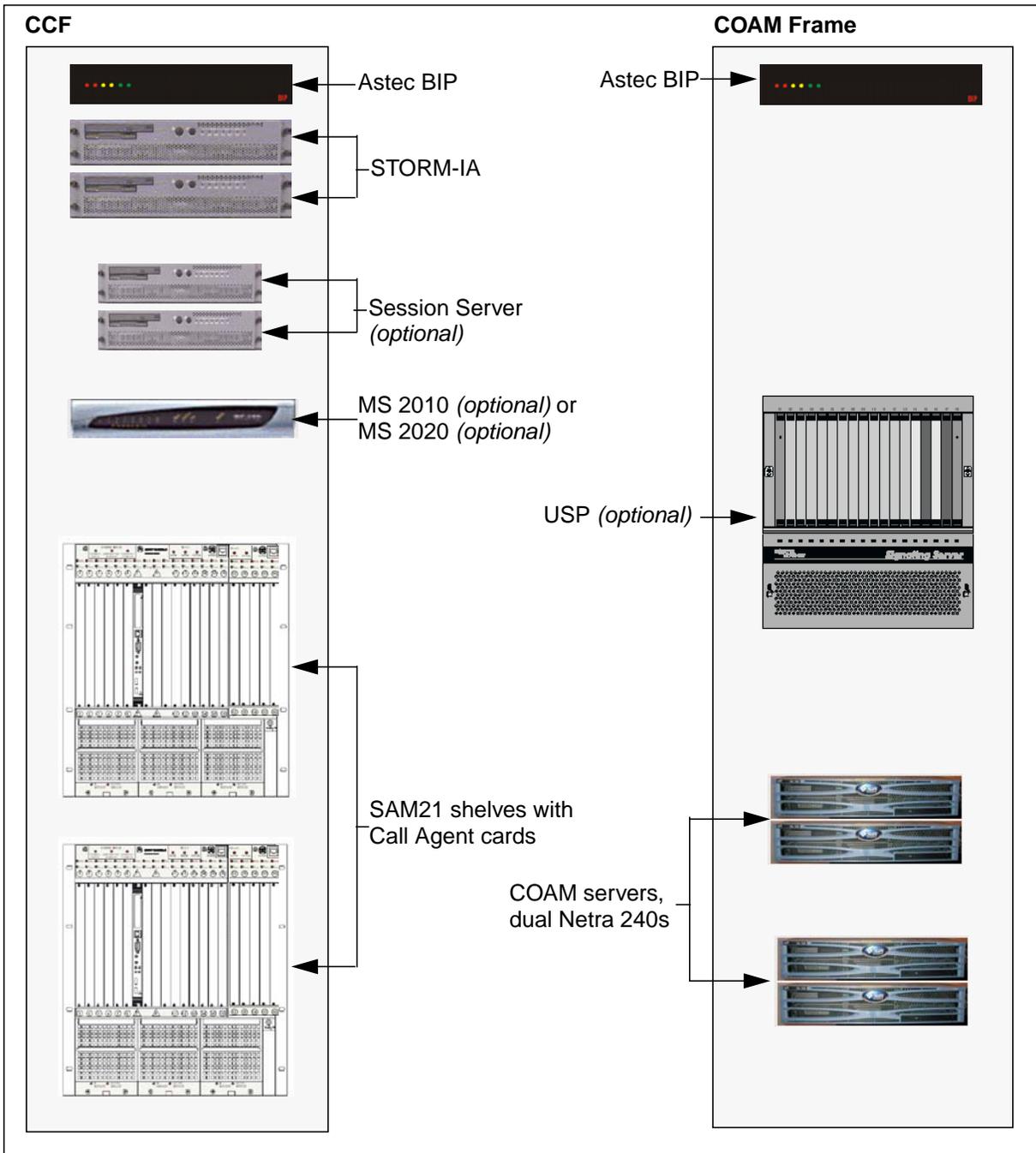
Each card in the shelf stores its own firmware in flash memory. During the software upgrade of each card, the SAM21 Shelf Controller can check if a newer firmware version is available and apply the new firmware on the card. This option is enabled by checking the “FW Flash Enable” checkbox on the Provisioning panel of the CS 2000 SAM21 Manager for each card. For more information, refer to the Upgrades document for the card type. The *SAM21 Platform Base Release Notes* indicate if a firmware upgrade is available for the release.

Note: This document does not discuss the HSC. In the event of a HSC failure or need for replacement, contact Nortel support personnel.

Hardware

Figure [SN08 PTE2000 frame layout](#) shows a block diagram of a Call Control Frame used in the CS 2000 - Compact product, and a SAMF frame used with either a CS 2000 or CS 2000 - Compact.

SN08 PTE2000 frame layout



- BIP - Breaker Interface Panel
- CCF - Call Control Frame
- COAM - Cabinetized OAM Frame
- MS2010 - Media Server 2010 (up to 6 for each frame)
- MS2020 - Media Server 2020 (up to 5 for each frame)
- SAM21 - Services Application Module 21
- USP - Universal Signaling Point

Call Control Frame (CCF)

The CS 2000 - Compact is housed in the Call Control Frame (CCF), an OAME or COAM frame, and an optional SAMF frame if additional capacity is needed.

Call Control Frame (CCF)	Status
NTRX51FA (for STORM cPCI)	Supported
NTRX51TA (for STORM-IA, MS2010/MS2020 Media Servers and Session Server)	Shipping baseline
<p>The CS2000 - Compact hardware is located in the CCF. This includes the two STORM-IA and two SAM21 shelves. The SAM21 shelves are equipped with the Call Agent cards, Gateway Controllers (GWC) cards, SAM21 Shelf Controller cards, and optionally USP-Compact (USPc) and Centrex IP Client Manager (CICM) cards. Up to six MS 2010 chassis or five MS 2020 chassis may also reside in the CCF assuming Session Server is not provisioned.</p>	

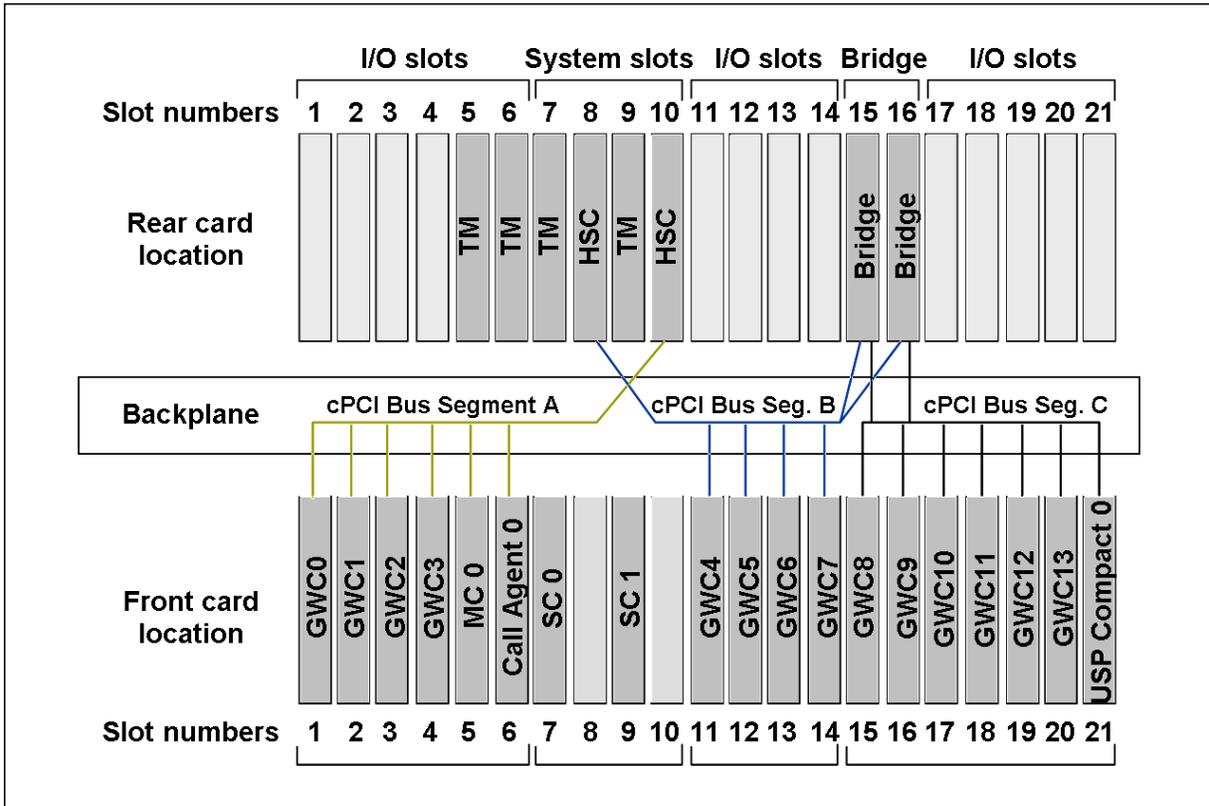
Power distribution shelf, BIP	Status
NTRX51HD	Shipping baseline
<p>The Breaker Interface Panel (BIP) occupies the top position in the frame. The BIP has an alarm module and up to four breaker modules. Locations not occupied by a breaker module require a filler module.</p> <p>The Alarm Module NTRX51HC monitors BIP status and has four inputs to monitor shelf level alarm outputs. Front panel LEDs indicate minor, major, and critical alarms. An array of yellow LEDs provides "Follow Me" visual indicator for operating company personnel. The alarm module also provides connections for gathering lineup alarms.</p> <p>Each Breaker Module has an independent DC input power feed and distributes up to five power feeds to shelves in the frame. Breaker Modules are provided in pairs, one for the "A" power feed and one for the "B" feed.</p> <p>An optional Breaker Interface Module (NTRX51HN) (5,5,5,15,15) (BIM) at the top of each frame supports power distribution to the Session Server.</p>	

STORage Manager (STORM)	Status
NTRX51FM cards, and DotHill RAID chassis (for STORM cPCI)	Supported
NTRX51GX, (for STORM-IA)	Shipping baseline
NTRX51NE, (for STORM-IA, AC power)	Shipping baseline
<p>The STORM-IA application provides persistent data storage. The application runs on a redundant pair of SAM-XTS servers that are installed directly below the BIP. The SAM-XTS is a 2U NEBS-compliant server based on Intel architecture. Each server has a 2+ GHz Pentium 4 Xeon Processor and contains two hot swap SCSI disk drives (72 GB).</p> <p>Connectivity to the STORM-IA is through dual gigabit Ethernet Base-T copper interfaces. Each server is connected to both CS LAN routers/switches and the servers are also connected to each other over gigabyte Ethernet with a pair of NTRX5145 cables.</p>	

SAM21 shelf	Status
NTRX51FX, (for SAM21 shelf)	Shipping baseline
NTRX51NA, (for SAM21 shelf, AC power)	Shipping baseline
<p>The Nortel SAM21 shelf uses Motorola CPX8221 hardware. An alarm panel is at the top of the shelf, above the card slots. The fan and power supplies are located at the bottom of the shelf, below the card slots.</p>	

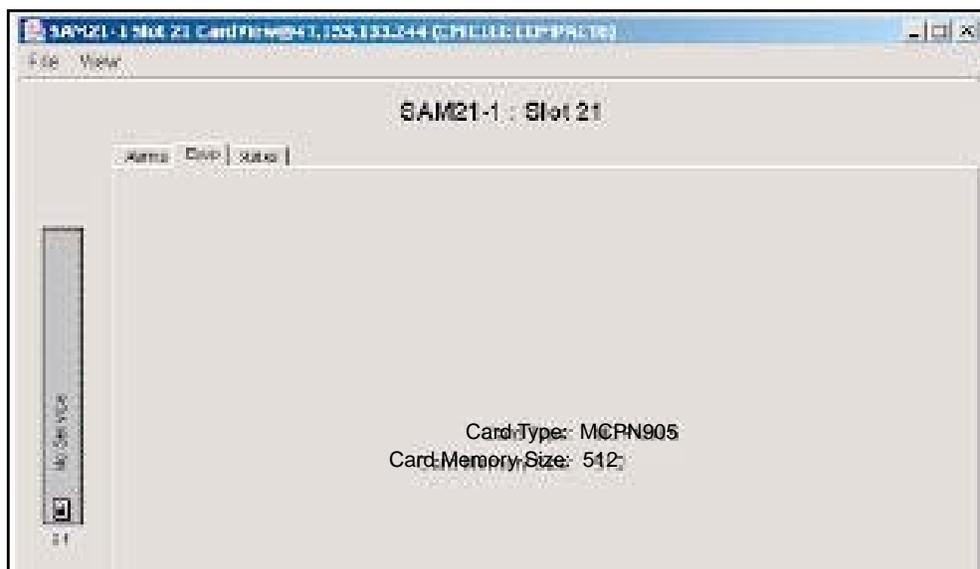
Packfill depends on the office configuration and customer needs. [Figure SAM21 Shelf slot layout](#) shows packfill for front and rear card locations. The Message Controller in slot 5 is available in some markets that need to support services provided by legacy peripheral modules (PM).

SAM21 Shelf slot layout



Several cards now have more than one card type. The CS 2000 SAM21 Manager displays the card name and the corresponding memory size in the Equip tab of the card view. The following figure shows an example. The CS 2000 SAM21 Manager contains bootp entries for all card types and assigns the correct loads to the selected cards during the provisioning process.

Card view example



SAM21 Shelf Controller	Status
NTRX51BH	Supported
NTRX51FH	Shipping baseline
NTRX51BK (Transition Module)	Shipping baseline
<p>SAM21 Shelf Controller cards are provisioned in slots 7 and 9 of each CPX8221 shelf. Each card has one 10/100 BaseT Ethernet port. The hardware is a Motorola SMM750HA-1352-F board, model number MCP750HA, with a MPC750 366MHz processor and 128 MB RAM, running Linux PowerPC operating system. Two transition modules are provided with each SAM21 shelf.</p>	

Gateway Controller (GWC)	Status
NTRX51BL (MCG MCPN750)	Shipping baseline

Gateway Controller (GWC)	Status
<p>NTRX51DL (MCPN905-240)</p> <p>GWC cards are configured in pairs, one active and one standby. On new installations, the cards are split between the two SAM21 shelves to provide cross-shelf sparing. Each GWC card has one 10/100 BaseT Ethernet port.</p> <p>The MCG MCPN905-240 card has 1.0GHz and 512 MB RAM. The Motorola MCPN750 board, model number MCPN750A, with a 366 MHz processor and 128 MB RAM, is supported in SN08.</p> <p>The 750- and 905-based cards can coexist in a CS2000 - Compact. However, both GWC cards of a mated pair must be of a consistent hardware type: they cannot be mixed, except as part of the upgrade process.</p> <p>GWCs are not needed for CS 2000 - Compact offices that use TDM peripherals only.</p>	<p>Shipping baseline</p>

Call Agent	Status
<p>NTRX51FZ (1.0 GB RAM)</p>	<p>Supported</p>
<p>NTRX51GZ (1.5 GB RAM)</p>	<p>Shipping baseline</p>
<p>NTRX51FS (Transition Module)</p>	<p>Shipping baseline</p>
<p>Two Call Agent cards (NTRX51GZ) are used for redundancy, with only one being active at a time. The cards must be on different shelves. Each Call Agent has two 10/100 BaseT Ethernet ports and a fiber channel interface, providing ATM over OC-3 that is connected directly to the fiber channel interface on the other Call Agent. If the Call Agent is part of an Enterprise CS 2100 with Geographic Survivability, the fiber channel interface is connected to the CS LAN.</p> <p>The Call Agent card is a Motorola MCPN765 board, with MPC7410 500 MHz processor and 1.5GB RAM, running LinuxPPC operating system (Nortel distribution). Ethernet ports are on the rear Transition Module. The fiber channel interface is provided by a Systran fiber channel PCI Mezzanine Card (PMC). An NTRX51FS transition module is needed for each Call Agent card.</p>	

Message Controller	Status
NTRX51GY	Shipping baseline
NTRX51FS (Transition Module)	Shipping baseline
<p>Message Controller cards are used in configurations requiring connectivity to legacy peripheral modules (PM). The hardware includes two MC cards (NTRX51GY), and two rear Transition Modules. Each MC is a Motorola MCPN765 board with MPC7410 500 MHz processor, 512 MB RAM, two multi-mode ATM PMCs, and two 10/100 Ethernet ports, running LinuxPPC operating system (Nortel distribution), and using the open source ATM stack. The PMCs are Interphase 4576-500A.</p> <p>Hardware runs in a diskless standalone design that has no user login capability. However, a login method exists for Nortel field access.</p>	

Centrex IP Client Manager and CICM Manager	Status
NTRX51HJ (Processor Card)	Shipping baseline
NTRX51HK (Transition Module)	Shipping baseline
<p>CICM provides Centrex IP functionality for the Carrier Voice over IP network by exchanging H.248 protocol messages with GWCs. Hardware is a Motorola 5385 card with a 40GB hard drive and a Transition Module.</p> <p>CICM provides the following functionality:</p> <ul style="list-style-type: none"> • parses incoming H.248 messages from GWC • generates outgoing H.248 messages to GWC • manages call context, including NULL context • manages physical, ephemeral, and root terminations, including state • isolates hardware specific details from the H.248 functionality by providing neutral interfaces • implements a synchronization mechanism with a peer MG • provides QoS reporting 	

Media Server	Status
Universal Audio Server (UAS)	Supported
MS 2010 - NTRX51JF	Shipping baseline: 120 ports, no conferencing, IP
MS 2010 - NTRX51JG	Shipping baseline: 240 ports, no conferencing, IP
MS 2010 - NTRX51JJ	Shipping baseline: 120 ports, conferencing, IP
MS 2010 - NTRX51JK	Shipping baseline: 240 ports, conferencing, IP
MS 2010 - NTRX51JL	Shipping baseline: 240 ports PT-IP solution, no conferencing, IP
MS 2010 - NTRX51NK	Shipping baseline: 120 ports, no conferencing, AC power, IP
MS 2010 - NTRX51NL	Shipping baseline: 240 ports, no conferencing, AC power, IP
MS 2010 - NTRX51NM	Shipping baseline: 120 ports, conferencing, AC power, IP
MS 2010 - NTRX51NN	Shipping baseline: 240 ports, conferencing, AC power, IP
MS 2020 - NTRX51MA	Shipping baseline: 240 ports, no conferencing, ATM
MS 2020 - NTRX51MB	Shipping baseline: 480 ports, no conferencing, ATM
MS 2020 - NTRX51MC	Shipping baseline: 240 ports, conferencing, ATM

Media Server	Status
MS 2020 - NTRX51MD	Shipping baseline: 480 ports, conferencing, ATM
<p>The rackmount chassis that host the Media Server application are 1U 19-inch for MS 2010, and 2U 19-inch for MS 2020. The processing function in the chassis is provided by the Audiocodes IPM-1610 for the MS2010 and TP-6310 for the MS2020. The MS 2010 is available on the NTRX51TA Call Control Frame and for AC powered CS 2000 - Compact, NTRX51NZ. It is not available for NTRX51FA. It replaces the SAM16 UAS IP solution as of SN06.2.</p>	

USP - Compact	Status
NTRX51FN <i>(for T1 interface)</i>	Shipping baseline
NTRX51FJ <i>(for E1 interface)</i>	Shipping baseline
NTRX51TD <i>(T1 or E1 mode)</i>	Provisionable Default: T1
<p>The USP - Compact provides a cost effective Signaling Gateway function in a small footprint. One USP - Compact system consists of two USP - Compact cards (MCPN905-220, 866 MHz, 512 MB). The USP - Compact cards can be located on the SAM21 shelf in the CS2000 - Compact, or on different shelves to increase redundancy (recommended).</p>	
<p>USP - Compact supports a maximum of 16 links and linksets on the two cards. USP - Compact supports channelized T1/E1 SS7 links (4 or 8 channels per card), and IPS7 connections, but does not support m2pa IP High speed SS7 links, ATM based high speed SS7 links, DS0a SS7 links, or V-35 SS7 links.</p>	

OAME/COAM frame

The OAME frame in SN06, or COAM frame in SN06.2 contains the hardware required for element management.

Frame	Status
NTRX51KE (OAME)	Supported
NTRX51LA (COAM)	Shipping baseline

CS 2000 Management Tools server/Integrated EMS	Status
Sun Microsystems Netra t1400	Supported in NTRX51KE
NTRX51LC - Sun Microsystems Netra 240 with 4 GB RAM	Shipping baseline
<p>With the Netra 240 servers, either two units running in high availability cluster mode or simplex mode can be configured.</p> <p>This server runs management application software such as CS 2000 SAM21 Manager, GWC Manager, QOS Collector Application (QCA), Trunk Maintenance Manager (TMM), Line Maintenance Manager (LMM), and OSS configuration gateway (OSSGATE). In SN06.2 configurations this host can also provide the Audio Provisioning Server (APS).</p>	

Billing Manager	Status
SuperNode Data Manager (SDM)	Shipping baseline until manufacture-discontinued. Not supported for configurations with Geographic Survivability

Billing Manager	Status
<p>Core and Billing Manager (CBM)</p> <p>For SN07 the Core and Billing Manager (CBM) replaced the SuperNode Data Manager (SDM) as the billing and core management system for the CS 2000 - Compact.</p> <p>In SN08, the CBM is setup in a high availability configuration using two Sun Microsystems Netra 240 servers in the COAM frame. The CBM software consists of the CSEN application load. CBM is <i>not</i> supported on the t1400 hardware.</p>	<p>Shipping baseline after SDM is manufacture -discontinued</p>
KVM switch and foldaway monitor	Status
	<p>Supported, no longer shipped</p> <p>The Keyboard Video Mouse (KVM) switch and one foldaway monitor were provided as part of the SAM16 based Universal Audio Server (UAS). The functionality provided by the UAS is now provided by the Media Server 2000 series.</p>
Power inverter	Status
	<p>Supported, no longer shipped</p> <p>The inverter was required to provide AC power to the KVM.</p>

SAMF frame

The SAMF is an optional frame.

Frame	Status
NTRX51HA	Shipping baseline
<p>Optional SAMF frames are available for added port capacity. Each SAMF can support up to two SAM21 shelves, or two SAM21 shelves, six MS 2010s or five MS2020s. Two Session Server chassis are always provisionable in the SAMF frame, regardless of the number of SAM21 shelves or media servers.</p> <p>Two SAM21 shelves in the SAMF can support up to 16 GWC pairs. The GWC units are split across shelves for extra reliability.</p> <p>CICM application cards can be provisioned in the SAM21 shelves. Up to 15 CICM cards can be provisioned in each SAM21 shelf. Each CICM card requires an NTRX51HM transition module. CICM cards cannot be provisioned in slots 15 or 16 because those slots do not support transition modules.</p>	

Environmental specifications

This section identifies the power requirements, environmental tolerances, and regulatory compliance information.

Power requirements

The following table lists power requirements for the CCF and SAMF.

Power requirements for CCF and SAMF

Frame	Equipment	Current draw at -48 VDC (nominal)	Current draw at -41.5 VDC (maximum draw)
CCF (NTRX51TA)	Standard configuration: two SAM21 shelves, two STORM-IA, two Call Agent cards, Session Server	18 Amps	21 Amps
	GWC (NTRX51BL)	Add 0.75 Amps for each GWC pair	Add 0.9 Amps for each GWC pair
	GWC (NTRX51DL)	Add 1.3 Amps for each GWC pair	Add 1.5 Amps per GWC pair

Power requirements for CCF and SAMF (Continued)

Frame	Equipment	Current draw at -48 VDC (nominal)	Current draw at -41.5 VDC (maximum draw)
	USP - Compact (NTRX51FJ/FN)	Add 0.9 Amps for each pair	Add 1.0 Amp for each pair
	CICM (NTRX51HJ) and CICM Manager (NTRX51HK)	Add 1.2 Amps for each CICM or CICM Manager pair	Add 1.4 Amps for each CICM or CICM Manager pair
	Message Controller (NTRX51GY/FS)	Add 1.6 Amps for each pair	Add 1.8 Amps for each pair
	MS 2010 chassis (NTRX51JF/JG/JJ/JK/JL)	Add 0.9 Amps for each chassis	Add 1.0 Amp for each chassis
	MS2020 chassis (NTRX51MA/MB/MC/MD)	Add 2.0 Amps for each chassis	Add 3.5 Amps for each chassis
SAMF (NTRX51HA)	SAM21 shelf (NTRX51FV)	Add 3.5 Amps for each SAM21 shelf	Add 4.1 Amps for each SAM21 shelf
	GWC (NTRX51BL)	Add 0.75 Amps for each GWC pair	Add 0.9 Amps for each GWC pair
	GWC (NTRX51DL)	Add 1.3 Amps for each GWC pair	Add 1.5 Amps per GWC pair
	CICM (NTRX51HJ) and CICM Manager (NTRX51HK)	Add 1.2 Amps for each CICM or CICM Manager pair	Add 1.4 Amps for each CICM or CICM Manager pair
	MS 2010 chassis (NTRX51JF/JG/JJ/JK/JL)	Add 0.9 Amps for each chassis	Add 1.0 Amp for each chassis
	MS2020 chassis (NTRX51MA/MB/MC/MD)	Add 2.0 Amps for each chassis	Add 3.5 Amps for each chassis
	Session Server (NTRX51HX)	Add 3.0 Amps for each chassis	Add 3.5 Amps for each chassis

The following table lists power requirements for COAM frames.

Power requirements for COAM frames

Equipment	Voltage range	Typical current (Amps)	Comment
Frame level	-40 to -57 VDC	14.5 A at -48 VDC (700 watts) for two Netras and Inverter	Four feeds rated at 68 A
Sun Microsystems Netra 240	-36 to -72 VDC	6.0 A at -48 VDC (300 watts)	20-amp breaker
KVM switch	120 VAC	0.2 A at 120 VAC	Inverter powered
Foldaway monitor	120 VAC	0.2 A at 120 VAC	Inverter powered
Inverter	-48 VDC	2.5 A at -48 VDC	20-amp breaker
BPS2000	-40 to -57 VDC	2.0 A at -48 VDC	5-amp breaker

For best AC power redundancy, Nortel recommends a minimum of twelve 15-Amp circuit breakers dedicated to the CS 2000 - Compact. Each circuit breaker should provide power to a single duplex receptacle, for a total of 24 plug in locations. A 15-foot power cable is provided for each power input. Because the cables are 15 feet, receptacles must be within three feet of the frame. Follow the connection strategy below:

AC power circuit and outlet strategy

Equipment	Circuit breaker	Outlet
SAM21 0-A	0	0-0
SAM21 1-A	1	1-0
STORM 0-A	2	2-0
STORM 0-B	3	3-0
STORM 1-A	2	2-1
STORM 1-B	3	3-1
Session Server 0-A	4	4-0

AC power circuit and outlet strategy (Continued)

Equipment	Circuit breaker	Outlet
Session Server 0-B	5	5-0
Session Server 1-A	4	4-1
Session Server 1-B	5	5-1
Media Server 2010 0-A	6	6-0
Media Server 2010 0-B	7	7-0
Media Server 2010 1-A	6	6-1
Media Server 2010 1-B	7	7-1
CBM 0-A	8	8-0
CBM 0-B	9	9-0
CBM 1-A	8	8-1
CBM 1-B	9	9-1
CMTT 0-A	10	10-0
CMTT 0-B	11	11-0
CMTT 1-A	10	10-1
CMTT 1-B	11	11-1
Miscellaneous	12	As required

Power requirements for AC powered equipment

Equipment	Voltage range	Typical current (Amps)	Comment
SAM21 shelf, NTRX51NZ	90-260 V AC, 47-63 Hz	1.8 A at 115 VAC	no cards inserted
		2.02 A at 115 VAC	two SAM21 Shelf Controllers inserted
		2.39 A at 115 VAC	one Message Controller and two SAM21 Shelf Controllers inserted

Power requirements for AC powered equipment (Continued)

Equipment	Voltage range	Typical current (Amps)	Comment
		0.13 A at 115 VAC	Add 0.13 A for each GWC card inserted.
		<i>TBD</i> A at 115 VAC	Add <i>TBD</i> A for each MCPN905 GWC card
		0.26 A at 115 VAC	Add 0.26 A for each USP - Compact inserted.
		<i>TBD</i> A at 115 VAC	Add <i>TBD</i> A for each USPc MCPN905-220.
		4.53 A at 115 VAC	fully loaded shelf, two SAM21 Shelf Controllers, one Call Agent, one Message Controller, one USP - Compact, and 14 GWCs
		4.53 A at 115 VAC	fully loaded shelf, two SAM21 Shelf Controllers, one Call Agent (MCPN905-270) , one Message Controller, one USP - Compact (MCPN905-220), and 14 GWCs (MCPN905-240)
COAM server, Sun Microsystems Netra 240	90-260 VAC, 47-63 Hz	3 A at 115 VAC	3 A for each COAM server (very minor difference between CMTT and CBM)
SAM-XTS - STORM-IA and Session Server	100-127 VAC, 60 Hz, or 200-240 VAC, 50 Hz	2.5 A at 115 VAC	2.5 A for each chassis
Media Server 2010	90-260 VAC, 47-63 Hz	0.75 A at 115 VAC	0.75 A for each MS 2010

Environmental tolerances

The environmental specifications for each of the PTE 2000 based frames:

- temperature and humidity
 - during storage and transportation
 - temperature: -40 degrees Celsius to +70 degrees Celsius
 - humidity: maximum 95% at 40 degrees Celsius
 - installed and operational
 - temperature: +5 degrees Celsius to +40 degrees Celsius
 - short term temperature: -5 degrees Celsius to +50 degrees Celsius for less than 96 hours
 - humidity: 5 to 85%
 - short term humidity: 5 to 90%, not to exceed 0.024 kg water/kg of dry air
- altitude
 - installed and operational: -60 m (-197 ft.) to +1800 m (5905 ft.) above sea level
- earthquake
 - Each frame meets Telcordia Earthquake Zone 4 requirements when installed with appropriate frame anchor kits.
- acoustic
 - Each frame meets the Verizon NEBS checklist, SIT.NEBS.TE.NPI.2002.010, limit of 75 dB(A). In addition, the COAM frame meets the GR-63 Core requirement of 60 dB(A).

Regulator compliance

Electromagnetic Compatibility (EMC) The CS 2000 - Compact is tested and complies with the following EMC requirements described in the *CMAC Electromagnetic Compatibility Test Plan*, R0000698-TP-EMC-NEBS-01-01:

- radiated emissions
- conducted emissions
- conducted immunity
- radiated immunity
- surge/voltage transients
- electrical fast transient burst
- ESD
- HF voltage dips and sags
- LF voltage dips and sags

The tests cover compliance to Verizon NEBS, AT&T NEDS, and SBC requirements.

Product safety The CS 2000 - Compact complies with the following product safety requirements:

- UL 60950
- EN 60950
- GR-1809-CORE Electrical Safety
- CSA C22.2 No. 60950

Tools and utilities

All tools and utilities for the SAM21 Shelf Controllers are provided by the CS 2000 SAM21 Manager. The CS 2000 SAM21 Manager client is a Graphical User Interface (GUI) applet that is started from a Java enabled web browser. The workstation with the web browser is customer supplied. The server application runs on the machine that hosts the CS 2000 Management Tools.

Software

Software loads

The software loadname for the SAM21 Shelf Controller is named 11.x.y.zzzzzzzzzz

where

11

is the version number for the SN08 release

x

is an integer value for the major version

y

is an integer value for the minor version

zzzzzzzzzz

is an integer value for the maintenance version

Once installed on the CS 2000 Core Manager, the software is labelled as SAM21 Platform v10.

Delivery and ordering processes

Software for the SAM21 Shelf Controllers is available by electronic transfer (ESD) or CDROM. The SAM21 Shelf Controller software is delivered as an RPM file to be installed with the platform_load_install.sh command on the CS 2000 Management Tools server. The SAM21 Shelf Controller software is then installed on the CS 2000 Core Manager or Core and Billing Manager (CBM). In some markets, the software is installed on the server that provides the CS 2000 Management Tools.

The ordering code for the NCL is SAM20008. The ordering code for MNCL releases is SAM2M008.

Upgrade and patch system

Software upgrade of the SAM21 Shelf Controller is completed through the CS 2000 SAM21 Manager. The SAM21 Shelf Controller software is not patchable.

OAM&P strategy

Operations, administration, maintenance and provisioning for the SAM21 Shelf Controllers is available through the CS 2000 SAM21 Manager client.

Interfaces

Network interfaces and protocols

The network interface to the SAM21 Shelf Controller is a 10/100 Base T interface on the faceplate of the SAM21 Shelf Controller. This interface uses TCP/IP to communicate with other components in the Carrier Voice over IP network and to communicate with the CS 2000 SAM21 Manager. BOOTP and TFTP protocols are used on this interface to boot the SAM21 Shelf Controller. SNMP is used to coordinate messages between the SAM21 Shelf Controllers and the CS 2000 SAM21 Manager server.

If the SAM21 Shelf Controllers are configured with ATM interfaces, SNMP is used to report OMs to the SNMP Poller application on the CS 2000 Management Tools server and to the IEMS application, if those applications are available.

User interfaces

The CS 2000 SAM21 Manager provides the user interface to the SAM21 Shelf Controllers.

Many windows for the CS 2000 SAM21 Manager client have a help button. When the help button is clicked, the client application checks the entries in the various fields and provides help text for entries that are incorrect. For example, the following figure is the help text when an attempt is made to reprovision a MAC address for a shelf controller with less than 12 characters.

